# RADIATION SAFETY AWARENESS AMONG MEDICAL HEALTH PROFESSSIONALS IN A HYBRID OPERATING THEATER (CIGMIT) OF UNIVERSITI MALAYA MEDICAL CENTRE

**By**

**GAYATHRI NAIDU A/P RAMAKRISHNAN**



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Abstract

This study was carried out with the purpose to identify relationships between independent variables and Radiation Safety Awareness among health professionals in University Malaya Medical Centre. Therefore, health professionals' knowledge regarding radiation and their healthy behaviour/attitude during work time and management commitment was evaluated by a questionnaire. Data was collected using a close ended questionnaire and was analysed using IBM SPSS Statistics Version 20.0 software. The study group included a total of 150 individuals. The research was conducted using close-end questionnaire which encompass a set of questions divided into five parts concerning demographics, radiation safety awareness, knowledge, behaviour/attitude and management commitment. Findings shows that that knowledge of health professional and management commitment have a significant effect on radiation safety awareness, whereas behaviour/attitude has no significant effect on radiation safety awareness. As a conclusion all health professionals should be evaluated, and training programs should be scheduled. In addition, there is a need for mandatory improved education and training of all health professionals in principals of radiation safety to ensure compliance with radiation safety regulations. For future research, a higher number of respondents and hospitals will be more significant and could produce more distinct results.

**Keywords: Awareness,** Intraoperative imaging, Ionizing radiation, DNA damage, Shielding, Distance, Dose reduction, Knowledge, Behaviour/Attitude, Management Commitment

# ABSTRAK

Kajian ini dijalankan dengan tujuan untuk mengenal pasti hubungan antara pemboleh ubah bebas dengan Kesedaran Keselamatan Radiasi di kalangan Kumpulan Profesional Kesihatan di Pusat Perubatan Universiti Malaya. Oleh itu, pengetahuan Kumpulan Profesional Kesihatan tentang radiasi dan kelakuan/sikap mereka semasa bekerja, serta komitmen pihak pengurusan dinilai melalui borang soal selidik. Data telah dikumpul menggunakan soal selidik, dan dianalisis menggunakan perisian IBM SPSS versi 20.0. Seramai 150 orang telah terlibat dalam kajian ini. Kajian dijalankan menggunakan soalan tertutup yang merangkumi satu set soalan yang dibahagikan kepada lima bahagian iaitu demografi, kesedaran keselamatan radiasi, pengetahuan, kelakuan/ sikap dan komitmen pihak pengurusan. Keputusan menunjukkan bahawa pengetahuan Kumpulan Profesional Kesihatan dan komitmen pihak pengurusan mempunyai kesan yang signifikan terhadap kesedaran keselamatan radiasi, manakala kelakuan/sikap tidak mempunyai kesan yang signifikan terhadap kesedaran keselamatan radiasi. Sebagai kesimpulan, semua Kumpulan Profesional Kesihatan perlu dinilai dan program latihan harus dijadualkan. Di samping itu, mewajibkan penambah baikan dalam pendidikan dan latihan berkaitan keselamatan radiasi adalah perlu untuk memastikan peraturan keselamatan radiasi sentiasa dipatuhi. Bagi cadangan penyelidikan akan datang, keterlibatan pelbagai jenis hospital dan penambahan bilangan adalah lebih signifikan dan mungkin akan menghasilkan keputusan yang berbeza.



Kata kunci: Kesedaran, Pengimejan intraoperatif, Radiasi pengionan, Kerosakan DNA, Perisai, Jarak, Pengurangan dos, Pengetahuan, Kelakuan / Sikap, Komitmen pihak pengurusan

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LIST OF ABBREVATIONS

| | |
|---|---|
| IRCP | International Commission on Radiological Protection |
| ALARA | As Low as Reasonable Achievable |
| CT | Computed Tomography |
| MRI | Magnetic Resonance Imaging |
| PET | Positron emission tomography |
| UNSCEAR | United Nations Scientific Committee on the Effects of Atomic Radiation |
| DNA | deoxyribonucleic acid |
| PPE | personal protective equipment |
| RPC | Radiation protection culture |
| WHO | World Health Organization |
| ISO 9001 | International Organization for Standardization |

# LIST OF UNITS

| | |
|---|---|
| Gy | Gray |
| Sv | Sievert |
| Rem | Roentgen |
| msv | milisievert |

LIST OF APPENDICES

# CHAPTER 1

# INTRODUCTION

## 1.1Background of Study

The growing technical advancements have significant changes, with huge effects on the way human live. This is because, technology has become a fundamental part of human daily routine. Also, the technological advancement has contributed to the medical field, in which patients have benefited and recognized it quickly by adopting and incorporating it into the clinical routine without evaluation (Hertault et al., 2014). For example the introduction of CT and MRI scans, including surgical navigation which are being perform inside the operation theatre itself, are for safer surgery with their scope and benefits (Bruschi et al., 2014).



"Navigation in surgery", which depend on the clinical complications is considered as a broad area, that may have different purposes. It is a perfect example of the current modern technology in the medicine fields. This is because it helps transform surgery into safer and minimally invasive surgeries, but in terms of radiation safety, the awareness level of health professionals are still inadequate or unimportant (Omay & Barnett, 2010). However, there has been speedy technical progress in surgery navigation, reducing more complicated procedures, and unlocking new unity (Jung et al., 2006). An example is a simple localization tool used in the surgical theatre, which is now the centrepiece of technology employed in surgery.

Nowadays, medical imaging has been a vital tool to health professionals in diagnosing diseases. X - rays, fluoroscopy, mammography, computed tomography

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Appendix A Research Questionnaire

**Study title:** Radiation Safety Awareness Among Medical Health Professional

**Name of the Principal Investigator :** GAYATHRI NAIDU RAMAKRISHNAN

**Hand Phone Number : 0176832259**

**E-mail :**gayathri@umsc.my



**What is the study about?**

The primary objective of this thesis is to evaluate the awareness and knowledge of radiation safety among health professionals in intraoperative CT scan unit. Secondly, we want to identify the factors that determine Radiation Protection Practices among medical professionals. Finally, we will develop and evaluate new imaging and navigation techniques, with the primary goal to improve Intraoperative guidance to increase staff awareness and knowledge.

**Who is looked for?**

Inclusion criteria will be the operation theatre team.

**Time & Place of research study:**

This study will be done in a intraoperative imaging unit. The hybrid operating theatres of CIGMIT integrate CT and MRI scanners in an operating theatre which can be use during a surgery, providing surgeons with highly precise and up-to-date information. CIGMIT consists of two hybrid operating theatres complemented with a radio surgery centre; forming a comprehensive integrated facility.

**What will be the role of you in this study?**

Research study participant

**Are there any risks? Does it have any side effects?**

No risk or side effect, as this research is done through interviews and participant consent is taken before hand.



**What the study will be benefiting in you?**

The outcome of this study would increase knowledge and understanding in Radiation Safety awareness. By providing a level of employee safety information, it will be easier to minimize the harm for employees who have lack of information in this regard. Thus, it is considered that the necessary measures to protect the health of the employees are taken at the top level in these units, so a more effective and efficient service provision can be provided.

**What will the data be used for?**

To identify the factors that determine Radiation Protection Practices among medical professional as well as develop and evaluate new imaging and navigation techniques, with the primary goal to improve Intraoperative guidance to increase staff awareness and knowledge.

**CONFIDENTIALITY**

All the collected data will be stored until the thesis result is out. Then, paper shredder machine used to destroy the paper documents and deletion of all electronic data from folder and from the recycle bin. Participants detail will be anonymous.

**SECTION 1 DEMOGRAPHIC AND JOB-RELATED CHARACTERISTICS**

Please provide the following information about yourself. Please thick (/) on the appropriate answer.

**1.** What is your gender

a) Male ☐

b) Female ☐

2. What is your age?

a) Under 18 ☐
b) 18- 24 ☐
c) 25-34 ☐
d) 35-44 ☐
e) 45-54 ☐
f) 55-64 ☐
g) 65-65++ ☐

3. What is the highest level of education you received?

a) SPM/STPM or equivalent ☐

b) Diploma/ Advance Diploma or equivalent ☐

c) Master or equivalent ☐

d) PHD or equivalent

☐

e) Others _____(Please Specify)

4. Marital status:

a) Single ☐

b) Married ☐

c) Divorced /widowed ☐

5. Clinical experience

a) <1 ☐

b) 1-4 ☐

c) 5-9 ☐

d)≥ 10 ☐



6. Job Title

a) Nurse ☐

b) Attendant ☐

c) Radiology Medical Officer ☐

d) Surgeons ☐

e) Operation Theatre Technologist ☐

f) Anaesthetist ☐

## SECTION 2 RADIATON SAFETY AWARENESS

1. Regular radiation protection survey (audits) are conducted

| Strongly disagree | | | | | Strongly agree |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** |

2. Written operating procedure are readily available

| Strongly disagree | | | | | Strongly agree |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** |

3. There is a system for reporting of incidents and near incidents

| Strongly disagree | | | | | Strongly agree |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** |

4. Quarterly safety device test are performed and documented in log

| Strongly disagree | | | | | Strongly agree |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** |

## SECTION 3 KNOWLEDGE OF HEALTH PROFESSIONALS ON RADIATON PROTECTION

Please circle one number for each statement which most closely reflects how you feel (1 means you strongly disagree, 5 means you strongly agree).

1. To reduce external exposure to radiation, the time exposed to radiation should beminimized as much as possible

Strongly disagree Strongly agree

**1 2 3 4 5 6**

2.Radiation exposure above the permitted limit is associated with fetal malformation

Strongly disagree Strongly agree

**1 2 3 4 5 6**

3. The distance from an equipment generating radiation is related to safety during radiation

Strongly disagree Strongly agree

**1 2 3 4 5 6**

4. Radiation exposure above the permitted limit damages DNA of human body

Strongly disagree Strongly agree

**1 2 3 4 5 6**

5. Radiation (scattered ray) shattered when patients body is exposed to X-ray, doesn't affect human body, since it is secondary generated.

Strongly disagree Strongly agree

**1 2 3 4 5 6**

6. There are X-ray,α-ray, beta-ray and gamma-ray in kinds of radiation

Strongly disagree Strongly agree

**1 2 3 4 5 6**

7. It is possible to shield the body from X-ray using lead

Strongly disagree Strongly agree

**1 2 3 4 5 6**

## SECTION 4 BEHAVIOR/ATTITUDE OF HEALTH PROFFESIONALS TOWARDS RADIATION PROTECTION



1. Lead shielding should be used at entrances to operating theatre rooms and procedure rooms where radiological equipment is in use.

Strongly disagree Strongly agree

**1 2 3 4 5 6**

2. Personnel with known or suspected pregnancy should declare this condition. And pregnant workers should be careful when exposed to radiation.

Strongly disagree Strongly agree

**1 2 3 4 5 6**

3. Personnel should have a medical examination associated with radiation

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

4. Personnel should receive education and training to include radiation safety.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

**5.** Warning signs should be posted to alert personnel to potential hazards at entrances to Operating theatre where radiological equipment is in use.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

6. Shielding devices should be handled carefully, visually examined before use, and x rayed at least annually to detect and prevent damage that could diminish their effectiveness.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

7. Restricting access to operating rooms during fluoroscopic procedure except for the staff with shielding device.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

## SECTION 5 MANAGEMENT COMMITMENTS

1. Appropriate warning signs posted at entrance.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

2. A regulation for protection against radiation is available.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

3. Radiation Safety Manual available

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

4. Recommended shielding done for the walls of an X ray room/CT suit.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

5. There is radiation safety programme

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

6. There is a Radiation Safety committee in the hospital.

Strongly disagree Strongly agree

**1** **2** **3** **4** **5** **6**

Appendix B Ethics Approval Form

UNIVERSITY OF MALAYA MEDICAL CENTRE

**MEDICAL RESEARCH ETHICS COMMITTEE**
**(Formerly known as Medical Ethics Committee)**
**UNIVERSITY OF MALAYA MEDICAL CENTRE**
ADDRESS : LEMBAH PANTAI, 59100 KUALA LUMPUR, MALAYSIA
TELEPHONE : 03-79493209/2251 FAXIMILE : 03-79492030

| | |
|---|---|
| **NAME OF ETHICS COMMITTEE/IRB**<br>Medical Research Ethics Committee, University Malaya Medical Centre | **MREC ID NO: 2018531-6343** |
| **ADDRESS :** LEMBAH PANTAI, 59100 KUALA LUMPUR, MALAYSIA | |
| **PROTOCOL NO**(if applicable) : | |
| **TITLE:**<br>Radiation Safety Awareness Among Medical Health Professional | |
| **PRINCIPAL INVESTIGATOR :** Miss RATHIPPRIA AYAKANN | **SPONSOR**<br>- |

The following item [✓] have been received and reviewed in connection with the above study to conducted by the above investigator.

| | | | |
|---|---|---|---|
| [✓] | Application to Conduct Research Project(form) | Ver.No : | Ver.Date : 31-05-2018 |
| [✓] | Study Protocol | Ver.No : 1 | Ver.Date : 31-05-2018 |
| [✓] | Patient Information Sheet | Ver.No : 1 | Ver.Date : 31-05-2018 |
| [✓] | Consent Form | Ver.No : 1 | Ver.Date : 31-05-2018 |
| [ ] | Questionnaire | Ver.No : | Ver.Date : |
| [✓] | Investigator's CV / GCP ( Miss RATHIPPRIA AYAKANN,GAYATHRI NAIDU RAMAKRISHNAN, ) | Ver.No : | Ver.Date : |
| [ ] | Insurance certificate | Ver.No : | Ver.Date : |
| [✓] | Other documents | | |
| | 1) QUESTIONNAIRE | Ver.No : 2 | Ver.Date : 16-07-2018 |

and the decision is [✓]

[ ] Approved (Full Board)
[✓] Approved (Expedited)
[ ] Rejected(reasons specified below or in accompanying letter)

Comments:

Questionaire study. Ethical issues addressed.

*The Investigators are required to:*

1) *follow instructions, guidelines and requirements of the Medical Research Ethics Committee.*
2) *report any protocol deviations/violations to Medical Research Ethics Committee.*
3) *provide annual and closure report to the Medical Research Ethics Committee.*
4) *comply with International Conference on Harmonization – Guidelines for Good Clinical Practice (ICH-GCP) and Declaration of Helsinki.*
5) *obtain a permission from the Director of UMMC to start research that involves recruitment of UMMC patient.*
6) *ensure that if the research is sponsored, the usage of consumable items and laboratory tests from UMMC services are not charged in the patient's hospital bills but are borne by research grant.*
7) *note that he/she can appeal to the Chairman of Medical Research Ethics Committee for studies that are rejected.*
8) *note that Medical Research Ethics Committee may audit the approved study.*
9) *ensure that the study does not take precedence over the safety of subjects.*

Date of expedited approval : 21-08-2018
Approval By : LOOI LAI MENG (Chairman,MREC)

*This is a computer generated letter. No signature required.*